22 January 2021
GC(64)/INF/6

GENERAL Distr.
Original: English

International Atomic Energy Agency

GENERAL CONFERENCE

Sixty-fourth regular session
Sub-item 14(c) of the provisional agenda, 20 March 2021

Regulation of Uranium Enrichment

1. This document presents an overview of the regulation of uranium enrichment.

2. This document is in five parts:
   Part I describes briefly the purpose of the International Atomic Energy Agency.

   Part II describes the risks inherent in the improper storage of nuclear material.

   Part III presents multiple possible solutions to the issue. Delegates should consider the environmental, social and political issues associated with regulating uranium enrichment.

   Part IV is an overview of bloc positions. This is not an exclusive or exhaustive list of potential positions. Deep research on individual assignments is essential.

   Part V is a list of potential questions to considering during discussion of the topic.

   Part VI are resources to aid in researching the topic. It is recommended that delegates investigate these sources as they have inspired this topic.

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Section I—Introduction

The International Atomic Energy Agency, or the IAEA, was created on July 29, 1957 as a branch of the United Nations. The purpose of the organization has been to promote peaceful use of nuclear energy and in turn inhibit its military application. The use of radiation in cancer treatments has given IAEA responsibility of bringing radiation to developing countries.

Section II—Topic Background

Nuclear reactors most commonly utilize the uranium-235 isotope to produce vast amounts of energy. Uranium-235 possesses the unique property of undergoing fission (splitting) and releasing heat energy when struck by a neutron. The neutrons ejected from the nucleus during fission collide with other uranium-235 nuclei, causing a chain reaction. The resulting heat is used to produce steam, which pushes a turbine and generates electricity. Uranium mined from the ground (uranium oxide concentrate- U_3O_8) contains, on average, 0.7% uranium-235, however through a vaporization process can be increased (enriched) to 4-5%. This material is converted uranium dioxide which is made into fuel rods. Although some reactors can utilize unenriched uranium, uranium dioxide is the preferred fuel source to produce energy. If enriched further, (typically 20% or above is called highly enriched uranium) it can be weaponized. Generally speaking, the more enriched uranium is, the less material is needed for an explosive device.

The danger in highly enriched uranium lies mainly in the risk of nuclear proliferation and the creation of crude weapons by terrorist groups. As of 2016, 16.5 tons of highly enriched uranium lies in states lacking nuclear delivery weapons, providing them the raw material for nuclearization. Terrorist organizations seeking to build nuclear weapons are hindered primarily by their lack of fissile material such as enriched uranium or plutonium (which is much rarer than uranium). These weapons can be built either with high quantities of low quality uranium or between 25 and 60 kilograms of highly enriched uranium. A major security concern centers around the storage of spent fuel rods at research reactors or waste facilities. These facilities, whose security protocols vary greatly based on location, make them prime targets for terrorist attacks.

Actions taken by the IAEA on uranium enrichment focus on preventing proliferation. In partnership with the International Framework for Nuclear Energy Cooperation (GNEP), the IAEA pushes for the creation of global centers for uranium enrichment so that all enrichment can be overseen to prevent nuclear proliferation. Initially known as the Global Nuclear Energy Partnership, enriched uranium would be given to a country to use for energy. The byproducts would be given back to the GNEP, which would recycle the waste and give it to another country. The process reduced chances of nuclear proliferation while reducing wastes and providing countries with energy. The IAEA also supports strengthening the security of nuclear materials.

Section III—Possible Solutions

The quantity of enriched uranium used can be significantly reduced by switching from boiling water reactors to pressurized water reactors. Although pressurized water reactors involve more components for maintenance and are more labor intensive, they use much fewer fuel rods than boiling water reactors. Spreading information to countries lacking these types of reactors about how they work may succeed in promoting the replacement of boiling water reactors with pressurized water reactors.

The security of high level nuclear waste (such as highly enriched uranium and plutonium) may be strengthened in order to dissuade theft. Wastes from countries lacking sufficient protection could be given to a collective storage area, where the nuclear waste may be recycled and redistributed.

Section IV—Bloc Positions

African Bloc: Only South Africa has nuclear power, and they lack secure storage for the resulting nuclear waste. Bloc is generally indifferent to the situation at hand.

Asian Bloc: Japan has a limited amount of enrichment facilities that only meet around a third of its demand. Southeast Asia was declared free of highly-enriched uranium. In general, this block is somewhat indifferent to the topic of uranium enrichment, and complies with non-proliferation.

Latin American Bloc: All countries operating research reactors are part of a nuclear-weapon-free zone under the Treaty of Tlatelolco.

Middle Eastern Bloc: The JCPOA previously restricted Iran's uranium enrichment program but allowed neighboring countries to develop their own programs. In general, this bloc supports the development of uranium enrichment.

Western Bloc: The Western Bloc seeks to prevent proliferation and is taking steps to remove highly enriched uranium from non-nuclear weapon states.

Section V—Questions That Should Be Taken Into Consideration

How may the overall production of highly enriched uranium waste be slowed?

How to improve the security of unguarded high level waste sites?

What should be done about the existing highly enriched uranium in non-nuclear weapon states?

How might countries benefit from nuclear energy while not moving closer to nuclearization?

Section VI—Helpful Sites and Resources

Article—World Nuclear Association—International Framework for Nuclear Energy Cooperation
bit.ly/2vLISHJ (Shortened URL from www.world-nuclear.org)

Article—International Journal of Nuclear Security—Weaponizing Radioactive Medical Waste - The Looming Threat
bit.ly/3bNjQc0 (Shortened URL from tennessee.edu)

Article—Reuters—Waste Storage at Africa's Only Nuclear Plant Brimming
reut.rs/39Fndje (Shortened URL from www.reuters.com)

Article—World Nuclear Association—Uranium Enrichment
bit.ly/325bvMs (Shortened URL from www.world-nuclear.org)

Article—Nuclear Threat Initiative—Why Highly Enriched Uranium Is a Threat
bit.ly/38BtEDH (Shortened URL from www.nti.org)

Article—World Nuclear Association—Uranium in Africa
bit.ly/2SBeqsY (Shortened URL from www.world-nuclear.org)

Article—International Atomic Energy Agency—Research Reactors in Latin America and the Caribbean
bit.ly/2u6NW9f (Shortened URL from www.iaea.org)

Article—Energy Policy—Multinational Uranium Enrichment in the Middle East
bit.ly/38DzCnA (Shortened URL from www.researchgate.net)

Potential search terms— Dangers of highly enriched uranium, Uranium enrichment and terrorist forces, Pressurized water reactors vs boiling water reactors, How are fuel rods made, Weaponization of high-level nuclear waste, Security of nuclear waste, Nuclear proliferation, IAEA uranium enrichment